

REMARKS

The claims now presented are claims 1-20, which stand rejected under 35 USC 103(a) as being obvious to one of ordinary skill in the art over Ohshima 5936843 (claims 1-5, 11-14) or over Ohshima in view of Koors et al 6365964 (claims 6-10, 15-20). Applicants respectfully disagree with Examiner's application of the reference in this rejection, in view of the arguments below. In addition, applicants have amended independent claims 1 and 15 to supplement these arguments.

Applicants' invention is a circuit assembly having laterally adjacent organic and ceramic substrates in an arrangement that provides several advantages not previously found in the prior art. Among the recited characteristics of applicants' inventive claimed structure are that: (1) the ceramic substrate has a periphery defining a lateral surface surrounding a first surface, on which a circuit components is mounted; (2) the organic substrate has a periphery defining a lateral surface surrounding a first surface; and (3) a portion of the lateral surface of the organic substrate is adjacent to a portion of the lateral surface of the ceramic substrate so as to define an interface therebetween.

Examiner has read these recitations on the Ohshima reference embodiment of figures 1-3, which shows multi-chip module 101 mounted on a printed wiring board 18. Multi-chip module 101 itself comprises a base board 30, which may be ceramic. A thin film, multi-layer, organic circuit board 32 is formed on the lower side of base board 30 and supports, on its lower side, integrated circuit parts 14 and active circuit parts 16. A large, multi-fin heat sink is attached to, and completely covers, the upper side of base board 30 for removal of heat from the package. The top layer of multi-layer circuit board 32 is a wiring conductor 32A-1 that extends horizontally against the lower surface of base board 30 and is electrically connected vertically through a pin 34, a pin 52 of a

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terminal density conversion board 50 and a solder bump 60 to a pad 64 on printed wiring board 18.

In order to read the claim recitations cited above on the Ohshima structure, Examiner has been forced to rotate the orientation of the technology of the field of the invention 90 degrees counter-clockwise. This introduces a problem for Examiner, as it appears to be contrary to USPTO practice in interpreting pending claims. Although Examiner is required to give the pending claims “the broadest reasonable interpretation consistent with the specification,” this “broadest reasonable interpretation” of the claims must also be “consistent with the interpretation that those skilled in the art would reach” (MPEP §2111). The Ohshima structure of the reference is laid out and portrayed in the drawings in standard integrated circuit technology, with base board 30 and multi-layer circuit board 32 laid out horizontally and having long horizontal dimensions and a short thickness (vertical dimension). This technology is designed so that component mounting space exists on a two dimensional surface (horizontal in both the patent drawings and the Ohshima reference). Extra space for additional components is provided by increasing this horizontal surface area, not by increasing the board thickness perpendicular to this area, which could negatively affect both the manufacturability and the performance of the chip.

To remove any ambiguity in regard to this, the presented claims now state that “the thickness of the ceramic substrate in a direction perpendicular to the first surface thereof” is “shorter than a length of the first surface thereof in a direction perpendicular to the interface.” This language in the claims prevents the recited “first surface” of the ceramic substrate (on which the “circuit component” is mounted) from being read, as Examiner reads it in his rejection, on a vertical side surface (in the figures) of base board 30 and requires it to be read on one of the upper and lower surfaces (in the figures) thereof, contrary to Examiner’s reading. In addition, the Ohshima reference teaches away from the invention by covering the entire upper surface of base board 30

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with a large heat sink for maximum removal of heat and covering the entire lower surface of base board 30 with the organic multi-layer circuit board 32. In Ohshima, all circuit components are mounted on the multi-layer organic circuit board; and base board 30 is used strictly for overall structural support of the organic circuit board 32 (below) and the heat sink (above). In addition, Ohshima teaches away from the recited claims by presenting Examiner's chosen "lateral surface" of the ceramic substrate as the thin edge of a surface board with upper and lower (in the figures) component mounting surfaces. In standard manufacturing processes, this thin edge would be a sawn edge presenting a rough surface unsuitable for component mounting without expensive plating or metallization. Finally, of course, the thin dimension of base board 30, barely visible in figure 1, is an order of magnitude smaller than any of the power electronic components shown by Ohshima in the drawings; and the power components would be those mounted on the ceramic substrate. Small, leaded components such as resistors, capacitors, are difficult to mount on ceramic substrates due to the lack of mounting holes for the leads; and such mounting would not be standard industry practice.

Thus, Examiner's reading of the claims as presented does not pass the USPTO test of being "consistent with the interpretation that those skilled in the art would reach." In addition, the teachings of Ohshima, consistent with the practices and expectations of one of ordinary skill in the art, teach away from applicants' presented claims. Thus, not only does Ohshima not teach applicants' invention itself; it cannot serve as the basis for a combination of references used in a 35 USC 103 obviousness rejection of applicants' presented claims. This applies to the rejections of claims in which the Koors reference is added, since Koors is added only for certain other claim recitations in certain dependent claims. All claim rejections in the Office Action are fundamentally based on Ohshima, and this rejection should be withdrawn. All claims presented should be allowable over the prior art of record.

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Respectfully submitted,

A handwritten signature in black ink, appearing to read "Robert M. Sigler", written over a horizontal line.

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